

CLAIMS

1. In a time division multiple access wireless communication system that facilitates full duplex transmission of information, the wireless communication system including at least a transcoder, a base transceiver site and a router, the router being operably coupled between the transcoder and the base transceiver site and supporting a non-deterministic packetized transport for communicating information between the transcoder and the base transceiver site as a plurality of information packets, a method for the router to assist in improving signal quality of information transmitted by the base transceiver as perceived by a user of a wireless communication device, the method comprising the steps of:

receiving at least one information packet from the transcoder; and

communicating the at least one information packet to the base transceiver site in accordance with a priority scheme, wherein the priority scheme is based on a status of synchronization of transcoder transmission time and base transceiver site transmission time with respect to the at least one information packet.

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2. The method of claim 1, wherein the at least one information packet forms part of a first communication and wherein the step of communicating comprises the steps of:

determining a priority of a first information packet of the at least one information packet;

when the priority indicates that the transcoder transmission time is substantially in synchronization with the base transceiver site transmission time, communicating the first information packet to the base transceiver site; and

when the priority indicates that the transcoder and the base transceiver site are presently synchronizing the transcoder transmission time and the base transceiver site transmission time, storing the first information packet for a period of time to enable at least one higher priority information packet of a second communication to be communicated from the transcoder to the base transceiver site.

3. The method of claim 2, wherein when the priority indicates that the transcoder and the base transceiver site are presently synchronizing the transcoder transmission time and the base transceiver site transmission time, the method further comprising the steps of:

inserting a time-delay indication into a portion of the first information packet, the time-delay indication corresponding to the period of time that the first information packet was stored in the router; and

communicating the first information packet including the time-delay indication to the base transceiver site, wherein the time-delay indication is used by the base transceiver site to synchronize transcoder transmission time to base transceiver site transmission time.

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4. The method of claim 3, wherein the time-delay indication comprises the period of time that the first information packet was stored in the router.
5. The method of claim 3, wherein the time-delay indication comprises a quantity of packets that were communicated by the router to the base transceiver site during the period of time that the first information packet was stored in the router.
6. The method of claim 3, wherein the time-delay indication comprises an average period of time that the first information packet and previous information packets of the first communication were stored in the router.
7. The method of claim 3, wherein the time-delay indication comprises an average quantity of packets that were communicated by the router to the base transceiver site during the period of time that the first information packet and previous information packets of the first communication were stored in the router.
8. The method of claim 2, wherein the step of determining a priority of the first information packet comprises the step of evaluating a portion of the first information packet that includes an indication of the priority.

9. The method of claim 1, wherein the at least one information packet includes a first information packet that forms part of a first communication and a second information packet that forms part of a second communication and wherein the step of communicating comprises the steps of:

determining a priority and a time of arrival of the first information packet;

determining a priority and a time of arrival of the second information packet;

when both the priority of the first information packet and the priority of the second information packet respectively indicate that transcoder transmission time is substantially in synchronization with base transceiver site transmission time,

communicating the first information packet to the base transceiver site when the time of arrival of the first information packet precedes the time of arrival of the second information packet; and

communicating the second information packet to the base transceiver site when the time of arrival of the second information packet precedes the time of arrival of the first information packet.

10. The method of claim 1, wherein the information packet comprises at least one of an audio information packet and a video information packet.

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11. In a time division multiple access wireless communication system that facilitates full duplex transmission of information, the wireless communication system including at least a transcoder, a base transceiver site and a router, the router being operably coupled between the transcoder and the base transceiver site and supporting a non-deterministic packetized transport for communicating information between the transcoder and the base transceiver site as a plurality of information packets, a method for the transcoder to assist in improving signal quality of information transmitted by the base transceiver site as perceived by a user of a wireless communication device, the method comprising the steps of:

determining a priority of an information packet based on a status of synchronization of transcoder transmission time and base transceiver site transmission time with respect to the information packet;

including an indication of the priority in a portion of the information packet; and

communicating the information packet to the router, whereby the indication of priority is used by the router to prioritize communication of information packets to the base transceiver site.

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12. The method of claim 11, wherein the information packet forms part of a first communication and wherein the method further comprises the steps of:

prior to the step of determining a priority:

receiving an indication of a desired transcoder transmission time for the information packet, the indication of the desired transcoder transmission time being based on a period of time that at least one prior information packet of the first communication was stored in the router; and

determining the desired transcoder transmission time of the information packet based on the indication of the desired transcoder transmission time;

and wherein the step of communicating comprises the step of communicating the information packet to the router at the desired transcoder transmission time.

13. The method of claim 12, further comprising the step of :

prior to the step of determining a priority:

determining the status of synchronization of transcoder transmission time and base transceiver site transmission time with respect to the information packet based on the indication of the desired transcoder transmission time.

14. The method of claim 12, wherein the information packet comprises an audio packet and wherein the step of communicating the information packet to the router at the desired transcoder transmission time results in reduced audio delay of the information packet.

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15. The method of claim 12, wherein the step of receiving an indication comprises the step of receiving an indication of a desired transcoder transmission time for the information packet, the indication of the desired transcoder transmission time being based on an average period of time that a plurality of prior information packets of the first communication were stored in the router.

16. The method of claim 12, wherein the indication of the desired transcoder transmission time comprises a timing offset from a transcoder transmission time of a prior information packet of the at least one prior information packet of the first communication.

17. The method of claim 16, wherein the step of determining a priority of an information packet comprises the steps of:

when the timing offset is equal to zero, determining that the transcoder transmission time is synchronized with the base transceiver site transmission time;

when the timing offset is not equal to zero, determining that the transcoder and the base transceiver site are presently synchronizing the transcoder transmission time and the base transceiver site transmission time; and

determining the priority of the information packet as being higher when the transcoder transmission time is synchronized with the base transceiver site transmission time than when the transcoder and the base transceiver site are presently synchronizing.

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18. The method of claim 11, wherein the information packet forms part of a first communication and wherein the step of determining a priority of an information packet comprises the steps of:

determining whether an indication of a desired transcoder transmission time had been received within a predetermined period of time after conveyance of a prior information packet of the first communication; and

when the indication of the desired transcoder transmission time had not been received within the predetermined period of time, determining that the information packet is of highest priority.

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19. In a time division multiple access wireless communication system that facilitates full duplex transmission of information, the wireless communication system including at least a transcoder, a base transceiver site and a router, the router being operably coupled between the transcoder and the base transceiver site and supporting a non-deterministic packetized transport for communicating information between the transcoder and the base transceiver site as a plurality of information packets, a method for the base transceiver site to assist in improving signal quality of transmitted information as perceived by a user of a wireless communication device, the method comprising the steps of:

receiving an information packet from the router, the information packet including a time-delay indication and the time-delay indication corresponding to a period of time that the information packet was stored in the router;

determining a desired transcoder transmission time of a subsequent information packet based at least on the time-delay indication and a desired base transceiver site transmission time; and

communicating an indication of the desired transcoder transmission time to the transcoder.

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20. The method of claim 19, further comprising the step of receiving the subsequent information packet within a predetermined time period before the desired base transceiver site transmission time.

21. The method of claim 20, wherein the desired base transceiver site transmission time comprises commencement of a first time slot and wherein the predetermined period of time comprises a time span of a second time slot immediately preceding the first time slot.

22. The method of claim 19, wherein the time-delay indication comprises the period of time that the information packet was stored in the router.

23. The method of claim 19, wherein the time-delay indication comprises a quantity of packets that were communicated by the router to the base transceiver site during the period of time that the information packet was stored in the router.

24. The method of claim 23, wherein the step of determining a desired transcoder transmission time comprises the steps of:

determining a frame size and an associated transmission speed of the non-deterministic packetized transport between the router and the base transceiver site; and

determining the desired transcoder transmission time based at least on the frame size of the non-deterministic packetized transport, the associated transmission speed of the non-deterministic packetized transport, and the quantity of packets that were communicated by the router to the base transceiver site during the period of time that the information packet was stored in the router.

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25. In a time division multiple access wireless communication system that facilitates full duplex transmission of information, the wireless communication system including at least a transcoder, a base transceiver site and a router, the router being operably coupled between the transcoder and the base transceiver site and supporting a non-deterministic packetized transport for communicating information between the transcoder and the base transceiver site as a plurality of information packets, a method for the router to assist in improving signal quality of information transmitted by the base transceiver site as perceived by a user of a wireless communication device, the method comprising the steps of:

receiving an information packet from the transcoder;

storing the information packet for a period of time;

inserting a time-delay indication into a portion of the information packet, the time-delay indication corresponding to the period of time that the information packet was stored in the router; and

communicating the information packet including the time-delay indication to the base transceiver site, wherein the time-delay indication is used by the base transceiver site to synchronize transcoder transmission time to base transceiver site transmission time.

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26. The method of claim 25, further comprising the steps of:

receiving an indication of a desired transcoder transmission time from the base transceiver site, the indication of the desired transcoder transmission time being based at least partly on a time-delay indication of at least one prior information packet; and

communicating the indication of the desired transcoder transmission time to the transcoder.

27. The method of claim 25, wherein the time-delay indication comprises the period of time that the information packet was stored in the router.

28. The method of claim 25, wherein the time-delay indication comprises a quantity of packets that were communicated by the router to the base transceiver site during the period of time that the information packet was stored in the router.

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29. In a time division multiple access wireless communication system that facilitates full duplex transmission of information, the wireless communication system including at least a transcoder, a base transceiver site and a router, the router being operably coupled between the transcoder and the base transceiver site and supporting a non-deterministic packetized transport for communicating information between the transcoder and the base transceiver site as a plurality of information packets, a method for the transcoder to assist in improving signal quality of information transmitted by the base transceiver site as perceived by a user of a wireless communication device, the method comprising the steps of:

communicating a first group of information packets to the router, the first group of information packets forming part of a first communication;

prior to communicating an additional information packet of the first communication to the router, receiving an indication of a desired transcoder transmission time for the additional information packet, the indication being based on a period of time that the at least one information packet of the first group of information packets was stored in the router;

determining the desired transcoder transmission time of the additional information packet based on the indication of the desired transcoder transmission time; and

communicating the additional information packet to the router at the desired transcoder transmission time.

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30. The method of claim 29, wherein the indication of the desired transcoder transmission time comprises a timing offset from a transcoder transmission time of an information packet of the first group of information packets.

31. The method of claim 29, wherein the indication is based on an average period of time that information packets of the first group of information packets were stored in the router.

32. The method of claim 31, wherein each information packet of the first group of information packets is communicated to the router at a respective transcoder transmission time, wherein each respective transcoder transmission time of an information packet in the first group of information packets corresponds to a respective timing offset from at least one preceding transcoder transmission time, and wherein the indication of the desired transcoder transmission time comprises a timing offset from an information packet in the first group of information packets that is computed by averaging the respective timing offsets applied to the information packets in the first group of information packets.

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33. In a time division multiple access wireless communication system that facilitates full duplex transmission of information, the wireless communication system including at least a transcoder, a base transceiver site and a router, the router being operably coupled between the transcoder and the base transceiver site and supporting a non-deterministic packetized transport for communicating information between the transcoder and the base transceiver site as a plurality of information packets, a method for improving signal quality of information transmitted by the base transceiver site as perceived by a user of a wireless communication device, the method comprising the steps of:

determining, by the transcoder, a priority of a first information packet of a communication based on a status of synchronization of transcoder transmission time and base transceiver site transmission time with respect to the first information packet;

including, by the transcoder, an indication of the priority in a portion of the first information packet;

communicating, by the transcoder, the first information packet to the router;

determining, by the router, the priority of the first information packet;

when the priority indicates that the transcoder transmission time is substantially in synchronization with the base transceiver site transmission time, communicating, by the router, the first information packet to the base transceiver site;

when the priority indicates that the transcoder and the base transceiver site are presently synchronizing the transcoder transmission time and the base transceiver site transmission time:

storing, by the router, the first information packet for a period of time;

inserting, by the router, a time-delay indication into a portion of the first information packet, the time-delay indication corresponding to the period of time that the first information packet was stored in the router;

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communicating, by the router, the first information packet including the time-delay indication to the base transceiver site;

determining, by the base transceiver site, a desired transcoder transmission time of a subsequent information packet of the communication based at least on the time-delay indication and a desired base transceiver site transmission time; and

communicating, by the base transceiver site, an indication of the desired transcoder transmission time to the transcoder.

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34. In a time division multiple access wireless communication system that facilitates full duplex transmission of information, the wireless communication system including at least a transcoder, a base transceiver site and a router, the router being operably coupled between the transcoder and the base transceiver site and supporting a non-deterministic packetized transport for communicating information between the transcoder and the base transceiver site as a plurality of information packets, a method for synchronizing transcoder transmission time to base transceiver site transmission time to mitigate signal quality degradation due to variable delays introduced by the router and thereby improve signal quality of information transmitted by the base transceiver site as perceived by a user of a wireless communication device, the method comprising the steps of:

receiving, by the router, an information packet of a communication from the transcoder;

storing, by the router, the information packet for a period of time;

inserting, by the router, a time-delay indication into a portion of the information packet, the time-delay indication corresponding to the period of time that the information packet was stored in the router;

communicating, by the router, the information packet including the time-delay indication to the base transceiver site;

determining, by the base transceiver site, a desired transcoder transmission time of a subsequent information packet of the communication based at least on the time-delay indication and a desired base transceiver site transmission time; and

communicating, by the base transceiver site, an indication of the desired transcoder transmission time to the transcoder.

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35. A wireless communication system that facilitates full duplex transmission of information, the wireless communication system comprising:

a transcoder that converts information signals received from at least one wireline communication device into encoded information packets compatible with a time-based wireless transmission protocol and communicates the encoded information packets at respective transcoder transmission times;

a base transceiver site that transmits the encoded information packets to at least one wireless communication device at respective base transceiver site transmission times in accordance with the time-based wireless transmission protocol; and

a router, operably coupled between the transcoder and the base transceiver site, that receives each encoded information packet from the transcoder and communicates each encoded information packet to the base transceiver site in accordance with a priority scheme, wherein the priority scheme is based on a status of synchronization of transcoder transmission time and base transceiver site transmission time with respect to each encoded information packet.

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36. A wireless communication system that facilitates full duplex transmission of information between wireline communication devices and wireless communication devices, the wireless communication system comprising:

a transcoder that converts information signals received from at least one wireline communication device into encoded information packets compatible with a time-based wireless transmission protocol, assigns a priority to each encoded information packet based on a status of synchronization of transcoder transmission time and base transceiver site transmission time with respect to each encoded information packet, and communicates the encoded information packets at respective transcoder transmission times;

a router, operably coupled to the transcoder, that receives each encoded information packet from the transcoder, determines the priority of each encoded information packet, communicates a particular encoded information packet of a communication between a first wireline communication device and a first wireless communication device when the priority of the particular encoded information packet indicates that the transcoder transmission time is substantially in synchronization with the base transceiver site transmission time with respect to the particular encoded information packet, stores the particular encoded information packet of the communication for a period of time to produce a stored information packet when the priority of the particular encoded information packet indicates that the transcoder transmission time is not in synchronization with the base transceiver site transmission time with respect to the particular encoded information packet, inserts a time-delay indication into a portion of the stored information packet to indicate the period of time that the stored information packet was stored in the router, and communicates the stored information packet including the time-delay indication upon expiration of the period of time;

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a base transceiver site, operably coupled to the router, that receives each encoded information packet and stored information packet from the router, transmits each encoded information packet and stored information packet to a respective wireless communication device at a respective base transceiver site transmission time in accordance with the time-based wireless transmission protocol, determines a desired transcoder transmission time of a subsequent encoded information packet of the communication based on the time-delay indication, and communicates an indication of the desired transcoder transmission time to the transcoder, wherein the indication of the desired transcoder transmission time is used by the transcoder to select an appropriate transcoder transmission time for the subsequent encoded information packet of the communication and to determine the status of synchronization of transcoder transmission time and base transceiver site transmission time with respect to the subsequent encoded information packet of the communication.

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37. A base site controller for use in a wireless communication system that facilitates full duplex transmission of information, the base site controller comprising:

a transcoder that converts information signals received from wireline communication devices into encoded information packets compatible with a time-based wireless transmission protocol and communicates the encoded information packets at respective transcoder transmission times; and

a router, operably coupled to the transcoder, that receives each encoded information packet from the transcoder and communicates each encoded information packet to a base transceiver site in accordance with a priority scheme, wherein the priority scheme is based on a status of synchronization of transcoder transmission time and base transceiver site transmission time with respect to each encoded information packet.

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